



## DEFENSE INFORMATION SYSTEMS AGENCY

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ARLINGTON, VIRGINIA 22204-4502

IN REPLY  
REFER TO: Joint Interoperability Test Command (JTE)

**15 Nov 10**

### MEMORANDUM FOR DISTRIBUTION

SUBJECT: Special Interoperability Test Certification of the Network Equipment Technologies (NET)<sup>TM</sup> Voice Exchange<sup>TM</sup> (VX)900, VX1200, and VX1800 with Software Version 4.7.4v7

References: (a) DOD Directive 4630.05, "Interoperability and Supportability of Information Technology (IT) and National Security Systems (NSS)," 5 May 2004  
(b) CJCSI 6212.01E, "Interoperability and Supportability of Information Technology and National Security Systems," 15 December 2008  
(c) through (e), see Enclosure 1

1. References (a) and (b) establish the Defense Information Systems Agency (DISA), Joint Interoperability Test Command (JITC), as the responsible organization for interoperability test certification.

2. The NET<sup>TM</sup> VX900, VX1200, and VX1800 with software version 4.7.4v7 are hereinafter referred to as the SUT. The SUT meets all of its critical interoperability requirements and is certified for joint use within the Defense Information System Network (DISN) as a Deployed Network Element only with the American National Standards Institute (ANSI) T1.607 and T1.619a Digital Transmission Link Level 1 (T1) Primary Rate Interface (PRI) access interfaces. The SUT is also certified with the Fast Ethernet Institute of Electrical and Electronic Engineers (IEEE) 802.3u transport interface. The SUT is deployed as a mated pair, and both SUTs must be loaded with the same certified 4.7.4v7 software release in order to interoperate correctly. The SUT meets the critical interoperability requirements set forth in Reference (c), using test procedures derived from Reference (d). No other configurations, features, or functions, except those cited within this report, are certified by the JITC. This certification expires upon changes that affect interoperability, but no later than three years from the date of Defense Information Assurance (IA)/Security Accreditation Working Group (DSAWG) accreditation.

3. This finding is based on interoperability testing, DISA adjudication of open test discrepancy reports, review of the vendor's Letters of Compliance (LoC), and DSAWG accreditation. Interoperability testing was conducted by JITC at the Global Information Grid Network Test Facility, Fort Huachuca, Arizona, from 5 July through 6 August 2010. The DISA adjudication of outstanding test discrepancy reports and review of the vendor's LoC was completed on 30 July 2010. Review of the vendor's LoC was completed on 23 August 2010. The DSAWG granted accreditation on 5 November 2010 based on the security testing completed by DISA-led

IA test teams and published in a separate report, Reference (e). The Certification Testing Summary (Enclosure 2) documents the test results and describes the test network.

4. The overall interoperability status of the SUT is indicated in Table 1. The interfaces and associated Capability Requirements (CRs) and Feature Requirements (FRs) critical used to evaluate the interoperability status are listed in Table 2. The interoperability test status is based on the SUT's ability to meet:

a. Defense Switched Network (DSN) services for Network and Applications specified in Reference (c).

b. The overall system interoperability performance derived from test procedures listed in Reference (d).

**Table 1. SUT Interoperability Test Summary**

DSN Access Interfaces			
Interface & Signaling	Critical	Status	Remarks
T1 PRI (ANSI T1.607/T1.619a)	No <sup>1</sup>	Certified	Met all CRs and FRs.
DSN Transport Interfaces			
Transport Level	Critical	Status	Remarks
Fast Ethernet (IEEE 802.3u)	No <sup>2</sup>	Certified	Met all CRs and FRs with the following minor exceptions. The TDM ingress ITU-T G.711 secure and non-secure calls to non-transcoding ITU-T G.711 IP egress had a measured delay of 68 ms. <sup>3</sup> The SUT does not support forward error correction. <sup>4</sup>
Features And Capabilities			
Features And Capabilities	Critical	Status	Remarks
Synchronization	Yes	Certified	Met all CRs and FRs.
Network Management	Yes	Certified	Met all CRs and FRs.
MLPP	Yes	Certified	Met all CRs and FRs.
Voice Compression	Yes <sup>5</sup>	Certified	Met all CRs and FRs.
Secure Calls	Yes	Certified	Met all CRs and FRs.
Security	Yes	Certified	See note 6.
<b>NOTES:</b> 1 The UCR does not stipulate a minimum access interface requirement for a Deployed Network Element. 2 The UCR does not stipulate a minimum transport interface requirement for a Deployed Network Element. 3 The UCR states that TDM Ingress ITU-T G.711 secure and non-secure calls to non-transcoding ITU-T G.711 IP egress shall not increase delay by more than 50 ms per network element pair as measured end-to-end. The SUT had a measured delay of 68 ms. This was adjudicated by DISA as having a minor operational impact on 30 July 2010. 4 The SUT does not support forward error correction in accordance with the UCR 2008, Change 1, paragraph 5.9.3.1. This is a new UCR requirement and the vendor has 18 months (until July 2011) to develop and meet this requirement. 5 The UCR, section 5.9.3.1, states that the SUT must support at least one voice codec. The SUT is certified for use with voice compression codecs ITU-T G.711, ITU-T G.726, ITU-T G.729, ITU-T G.727, and both 6 and 5 kilobits per second ITU-T G.723.1. 6 Information assurance testing is accomplished via DISA-led Information Assurance test teams and published in a separate report, Reference (e).			

**Table 1. SUT Interoperability Test Summary (continued)**

<b>LEGEND:</b>			
802.3u	Standard for carrier sense multiple access with collision detection at 100 Mbps	IP	Internet Protocol
ANSI	American National Standards Institute	ISDN	Integrated Services Digital Network
CRs	Capability Requirements	ITU-T	International Telecommunication Union - Telecommunication Standardization Sector
DISA	Defense Information Systems Agency	kbps	kilobits per second
DSN	Defense Switched Network	Mbps	Megabits per second
DSS1	Digital Subscriber Signaling 1	MLPP	Multi-Level Precedence and Preemption
FRs	Feature Requirements	ms	milliseconds
G.711	Pulse Code Modulation of voice frequencies	PRI	Primary Rate Interface
G.723.1	Dual rate speech coder for multimedia communications transmitting at 5.3 and 6.3 kbps	SS7	Signaling System 7
G.726	32 kbps Adaptive Differential Pulse Code Modulation (ADPCM)	SUT	System Under Test
G.727	5-, 4-, 3- and 2-bit/sample embedded adaptive differential pulse code modulation (ADPCM)	T1	Digital Transmission Link Level 1 (1.544 Mbps)
G.729	9.6 kbps Conjugate-Structure Algebraic-Code-Excited Linear-Prediction (CS-A CELP)	T1.607	ISDN – Layer 3 Signaling Specification for Circuit Switched Bearer Service for DSS1
IEEE	Institute of Electrical and Electronics Engineers	T1.619a	SS7 and ISDN MLPP Signaling Standard for T1
		TDM	Time Division Multiplex
		UCR	Unified Capabilities Requirements

**Table 2. SUT Capability and Feature Interoperability Requirements**

DSN Access Interfaces			
Interface	Critical	Requirements Required or Conditional	References
T1 PRI (ANSI T1.607/T1.619a)	No <sup>1</sup>	<ul style="list-style-type: none"> <li>• DS1 Interface Characteristics (C) as specified in UCR 2008, Section 5.2.6.1</li> <li>• DS1 Supervisory Channel Associated Signaling (C) as specified in UCR 2008, Section 5.2.6.1</li> <li>• DS1 Clear Channel Capability (C) as specified in UCR 2008, Section 5.2.6.1</li> <li>• DS1 Alarm and Restoral Requirements (C) as specified in UCR 2008, Section 5.2.6.1</li> <li>• MOS (R)</li> <li>• BERT (R)</li> <li>• Secure Transmission (Voice and Data) (R) as specified in UCR 2008, Section 5.2.12.6</li> <li>• Modem (R)</li> <li>• Facsimile (R)</li> <li>• Call Control Signals (R)</li> <li>• Alarms (R) as specified in UCR 2008, Section 5.2.1.5.7</li> <li>• Call Congestion Control (R)</li> <li>• Call Congestion for TDM Transport (C)</li> <li>• Voice Compression (C)</li> </ul>	<ul style="list-style-type: none"> <li>• UCR Section 5.9.2.3.4</li> <li>• UCR Section 5.9.2.3.4</li> <li>• UCR Section 5.9.2.3.4</li> <li>• UCR Section 5.9.2.3.4</li> <li>• UCR Section 5.9.3.1</li> <li>• UCR Section 5.9.3.1</li> <li>• UCR Section 5.9.3.8</li> <li>• UCR Section 5.9.3.1</li> <li>• UCR Section 5.9.3.1</li> <li>• UCR Section 5.9.3.1</li> <li>• UCR Section 5.9.3.5</li> <li>• UCR Section 5.9.3.4</li> <li>• UCR Section 5.9.2.1.2.1</li> <li>• UCR Section 5.9.3.1</li> </ul>

**Table 2. SUT Capability and Feature Interoperability Requirements (continued)**

DSN Transport Interfaces			
Interface	Critical	Requirements Required or Conditional	References
IP Fast Ethernet (IEEE 802.3u)	No <sup>2</sup>	<ul style="list-style-type: none"> <li>• DS1 Interface Characteristics (R)</li> <li>• MOS (R)</li> <li>• BERT (R)</li> <li>• Forward Error Correction (R)</li> <li>• Secure Transmission (Voice and Data) (R) as specified in UCR 2008, Section 5.2.12.6</li> <li>• Modem (R)</li> <li>• Facsimile (R)</li> <li>• Call Control Signals (includes MLPP) (R)</li> <li>• Congestion Control (C) (IP interface only)</li> <li>• Voice Compression (C)</li> <li>• Alarms</li> <li>• Delay (R)</li> <li>• Jitter (R)</li> <li>• Packet Loss (R)</li> </ul>	<ul style="list-style-type: none"> <li>• UCR Section 5.9.2.3.4</li> <li>• UCR Section 5.9.3.1</li> <li>• UCR Section 5.9.3.1</li> <li>• UCR Section 5.9.3.1</li> <li>• UCR Section 5.9.3.8</li> <li>• UCR Section 5.9.2.1</li> <li>• UCR Section 5.9.2.1</li> <li>• UCR Section 5.9.3.7</li> <li>• UCR Section 5.9.3.4</li> <li>• UCR Section 5.9.3.1</li> <li>• UCR Section 5.9.3.5</li> <li>• UCR Section 5.9.3.3</li> <li>• UCR Section 5.9.3.3</li> <li>• UCR Section 5.9.3.3</li> </ul>
SUT Features And Capabilities			
Feature/Capability	Critical	Requirements Required or Conditional	References
Synchronization	Yes	<ul style="list-style-type: none"> <li>• Timing (R) as specified in UCR 2008, Section 5.2.10.1</li> </ul>	<ul style="list-style-type: none"> <li>• UCR Section 5.9.2.3.7</li> </ul>
Network Management	Yes	<ul style="list-style-type: none"> <li>• Management Option (R) Local Management (Front or Back Panel and/or External Console) (C)</li> <li>• ADIMSS (C) as specified in UCR 2008, sections 5.2.8, Network Management, 5.2.8.3, Fault Management, and 5.2.8.4, Configuration Management.</li> <li>• Fault Management (C)</li> <li>• Loop Back Capability (C)</li> <li>• Operational Configuration Restoral (R)</li> </ul>	<ul style="list-style-type: none"> <li>• UCR Section 5.9.2.4.1</li> <li>• UCR Section 5.9.2.4.2</li> <li>• UCR Section 5.9.2.4.3</li> <li>• UCR Section 5.9.2.4.4</li> </ul>
Security	Yes	<ul style="list-style-type: none"> <li>• STIGs and DoDI 8510.01 (DIACAP) (R)</li> </ul>	<ul style="list-style-type: none"> <li>• UCR Section 5.9.2.6</li> </ul>
<b>NOTES:</b> 1 The UCR does not stipulate a minimum required DSN access interface. 2 The UCR does not stipulate a minimum required DSN transport interface.			
<b>LEGEND:</b> 802.3u Standard for carrier sense multiple access with collision detection at 100 Mbps ADIMSS Advanced DSN Integrated Management Support System ANSI American National Standards Institute BERT Bit Error Rate Test C Conditional DIACAP Department of Defense Information Assurance Certification and Accreditation Process DoDI Department of Defense Instruction DS1 Digital Signal Level 1 DSN Defense Switched Network DSS1 Digital Subscriber Signaling 1 IEEE Institute of Electrical and Electronics Engineers IP Internet Protocol ISDN Integrated Services Digital Network Mbps Megabits per second MLPP Multi-Level Precedence and Preemption MOS Mean Opinion Score PRI Primary Rate Interface R Required SS7 Signaling System 7 STIGs Security Technical Implementation Guides SUT System Under Test T1 Digital Transmission Link Level 1 (1.544 Mbps) T1.607 ISDN – Layer 3 Signaling Specification for Circuit Switched Bearer Service for DSS1 T1.619a SS7 and ISDN MLPP Signaling Standard for T1 TDM Time Division Multiplexing UCR Unified Capabilities Requirements			

5. No detailed test report was developed in accordance with the Program Manager's request. JITC distributes interoperability information via the JITC Electronic Report Distribution (ERD) system, which uses Unclassified-But-Sensitive Internet Protocol Router Network (NIPRNet) e-mail. More comprehensive interoperability status information is available via the JITC System

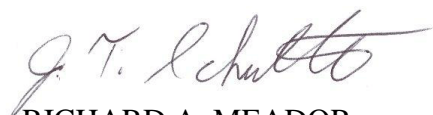
JITC, Memo, JTE, Special Interoperability Test Certification of the Network Equipment Technologies (NET)<sup>TM</sup> Voice Exchange<sup>TM</sup> (VX)900, VX1200, and VX1800 with Software Version 4.7.4v7

Tracking Program (STP). The STP is accessible by .mil/gov users on the NIPRNet at <https://stp.fhu.disa.mil>. Test reports, lessons learned, and related testing documents and references are on the JITC Joint Interoperability Tool (JIT) at <http://jit.fhu.disa.mil> (NIPRNet), or <http://199.208.204.125> (SIPRNet). Information related to DSN testing is on the Telecom Switched Services Interoperability (TSSI) website at <http://jitc.fhu.disa.mil/tssi>. Due to the sensitivity of the information, the Information Assurance Accreditation Package (IAAP) that contains the approved configuration and deployment guide must be requested directly through government civilian or uniformed military personnel from the Unified Capabilities Certification Office (UCCO), e-mail: [ucco@disa.mil](mailto:ucco@disa.mil).

6. The JITC point of contact is Mr. Khoa Hoang, DSN 879-4376, commercial (520) 538-4376, FAX DSN 879-4347, or e-mail to [khoa.hoang@disa.mil](mailto:khoa.hoang@disa.mil). The JITC's mailing address is P.O. Box 12798, Fort Huachuca, AZ 85670-2798. The tracking number for the SUT is 1001501.

FOR THE COMMANDER:

2 Enclosures a/s

  
for RICHARD A. MEADOR  
Chief  
Battlespace Communications Portfolio

Distribution (electronic mail):

Joint Staff J-6

Joint Interoperability Test Command, Liaison, TE3/JT1

Office of Chief of Naval Operations, CNO N6F2

Headquarters U.S. Air Force, Office of Warfighting Integration & CIO, AF/XCIN (A6N)

Department of the Army, Office of the Secretary of the Army, DA-OSA CIO/G-6 ASA (ALT), SAIS-IOQ

U.S. Marine Corps MARCORSYSCOM, SIAT, MJI Division I

DOT&E, Net-Centric Systems and Naval Warfare

U.S. Coast Guard, CG-64

Defense Intelligence Agency

National Security Agency, DT

Defense Information Systems Agency, TEMC

Office of Assistant Secretary of Defense (NII)/DOD CIO

U.S. Joint Forces Command, Net-Centric Integration, Communication, and Capabilities Division, J68

Defense Information Systems Agency, GS23

## **ADDITIONAL REFERENCES**

- (c) Office of the Assistant Secretary of Defense, "Department of Defense Unified Capabilities Requirements 2008 Change 1," 22 January 2010
- (d) Joint Interoperability Test Command, "Defense Switched Network Generic Switch Test Plan (GSTP), Change 2," 2 October 2006
- (e) Joint Interoperability Test Command, "Information Assurance (IA) Assessment of Network Equipment Technology (NET) Voice Exchange (VX) 900, 1200, 1800 Release (Rel.) 4.7.4 (Tracking Number 1001501)," 5 November 2010

## CERTIFICATION TESTING SUMMARY

**1. SYSTEM TITLE.** The Network Equipment Technologies (NET™) Voice Exchange™ (VX)900, VX1200, and VX1800 with Software Version 4.7.4v7; hereinafter referred to as the SUT.

**2. PROPONENT.** Defense Information Systems Agency (DISA) Teleport Program Office (TPO).

**3. PROGRAM MANAGER.** Mr. John Wilson, TPO, 5275 Leesburg Pike, Falls Church, Virginia, 22041, E-mail: john.wilson@disa.mil.

**4. TESTER.** Joint Interoperability Test Command (JITC), Fort Huachuca, Arizona.

**5. SYSTEM UNDER TEST DESCRIPTION.** The SUT is a Deployed Network Element (DNE). The SUT is deployed as a mated pair, and both SUTs must be loaded with the same certified 4.7.4v7 software release in order to interoperate correctly. The SUT is certified for use with voice compression codec's International Telecommunication Union - Telecommunication Standardization Sector (ITU-T) G.711, ITU-T G.726, ITU-T G.729, ITU-T G.727, both 6 and 5 kilobits per second (kbps) and ITU-T G.723.1. The SUT is certified in both Leased Line Emulation Mode (LLEM) and non-LLEM mode. Although the SUT supports Digital Transmission Link Level 1 (T1) Channel Associated Signaling (CAS), E1 CAS, T1 Primary Rate Interface (PRI), and E1 PRI interfaces. The SUT is only certified for use with American National Standards Institute (ANSI) T1.607 and T1.619a T1 PRI access interfaces. The SUT is also certified with the Fast Ethernet Institute of Electrical and Electronic Engineers (IEEE) 802.3u transport interface. The other interfaces are not certified or authorized for use. The SUT is certified with ITU-T V.150.1 modem over Internet Protocol (IP) for secure calls, and the SUT also has a proprietary Secure Relay that is certified for secure calls over mated pairs of the SUT. When configured for MLPP the SUT has the capability of providing b-channel availability and meets all requirements to do so.

The VX900 platform is a rack-mountable chassis that can be configured with one to eight T1 PRI interfaces, and up to two IP transport interfaces. This chassis has two expansion slots that can be populated with many card types; however, only the T1/E1 expansion boards configured for T1 ISDN PRI are certified by JITC.

The VX1200 platform is a rack-mountable chassis that can be configured with one to eight T1 PRI interfaces, and up to six IP transport interfaces. This chassis has two expansion slots that can be populated with many card types; however, only the T1/E1 expansion boards configured for T1 ISDN PRI are certified by JITC.

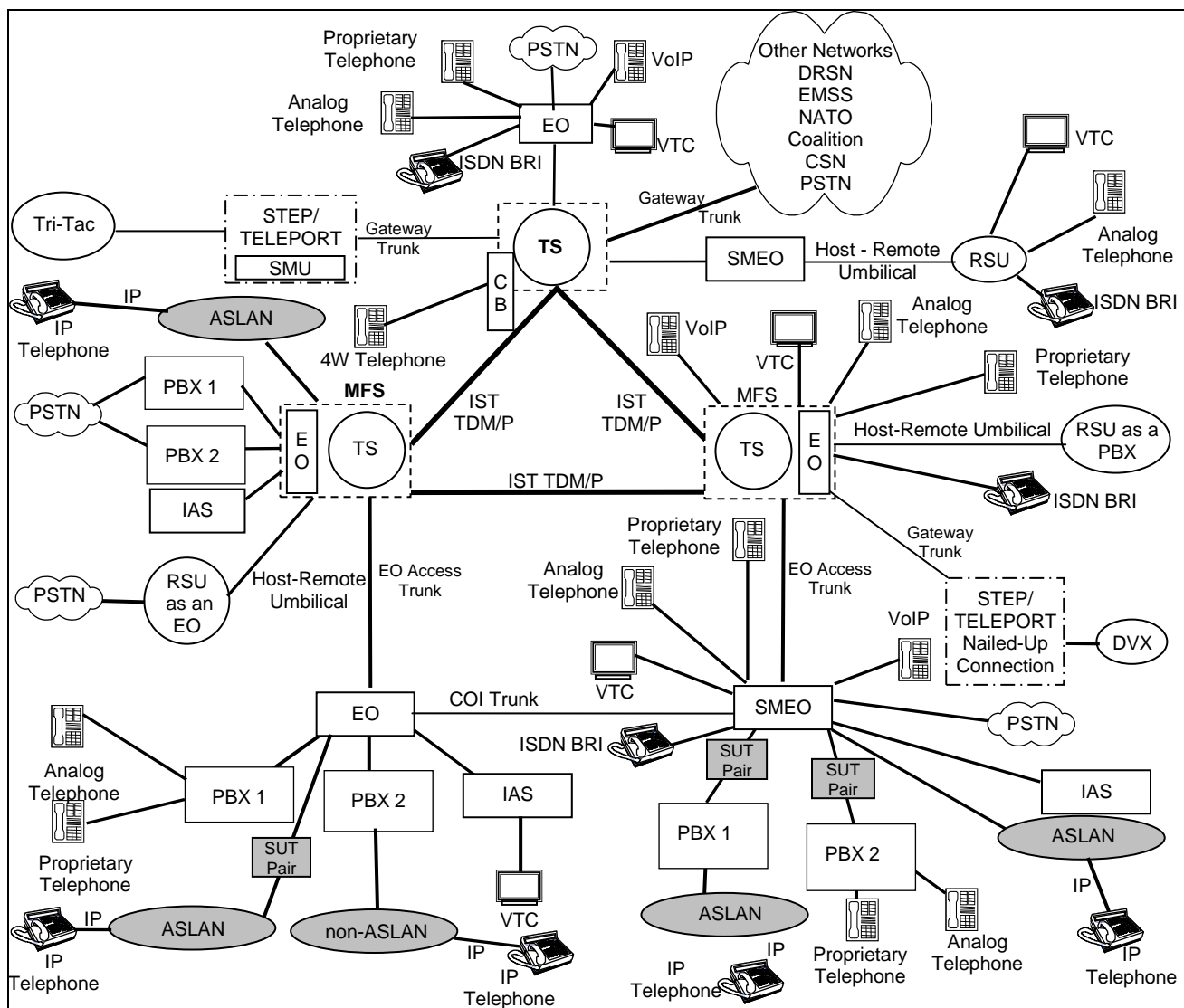
The VX1800 platform is a rack-mountable chassis that can be configured with 1 to 24 T1 PRI interfaces and 2 IP interfaces. This chassis has 6 expansion slots that can be populated with many card types; however, only the T1/E1 expansion boards configured for T1 ISDN PRI are certified by JITC.

VXWatch.exe software provides network operators with tools necessary to monitor network availability, report on IP network performance, and troubleshoot voice issues through a Graphical User Interface (GUI).

The SUT also requires the VXBuilder.exe application in order to configure the SUT. This application provides the ability to save configurations, manage system files on the SUT such as debug logs, crash logs, and configuration files through a GUI.

**6. OPERATIONAL ARCHITECTURE.** The Unified Capabilities Requirements (UCR) Defense Switched Network (DSN) operational architecture is depicted in Figure 2-1. This figure depicts the relationship of the SUT to the DSN switches in the operational architecture. The VX900, VX1200, and VX1800 are point-to-point devices that are fielded in pairs, and both must be loaded with the same certified 4.7.4v7 software releases in order to interoperate correctly.





**LEGEND:**

4W 4-Wire  
 ASLAN Assured Services Local Area Network  
 BRI Basic Rate Interface  
 CB Channel Bank  
 COI Community of Interest  
 CSN Canadian Switch Network  
 DRSN Defense Red Switch Network  
 DSN Defense Switched Network  
 DVX Deployable Voice Exchange  
 EMSS Enhanced Mobile Satellite System  
 EO End Office  
 IAS Integrated Access Switch  
 IP Internet Protocol  
 ISDN Integrated Services Digital Network  
 IST Interswitch Trunk  
 MFS Multifunction Switch

NATO North Atlantic Treaty Organization  
 PBX Private Branch Exchange  
 PBX 1 Private Branch Exchange 1  
 PBX 2 Private Branch Exchange 2  
 PC Personal Computer  
 PSTN Public Switched Telephone Network  
 RSU Remote Switching Unit  
 SMEO Small End Office  
 SMU Switched Multiplex Unit  
 STEP Standardized Tactical Entry Point  
 TDM/P Time Division Multiplex/Packetized  
 Tri-Tac Tri-Service Tactical Communications Program  
 TS Tandem Switch  
 SUT System Under Test  
 VoIP Voice over Internet Protocol  
 VTC Video Teleconferencing

**Figure 2-1. DSN Architecture**

**7. REQUIRED SYSTEM INTERFACES.** The SUT Interoperability Test Summary is shown in Table 2-1 and the Capability and Feature Requirements used to evaluate the interoperability of the SUT are indicated in Table 2-2. The SUT met these requirements through testing and submission of Letters of Compliance (LoC).

**Table 2-1. SUT Interoperability Test Summary**

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ANSI	American National Standards Institute	ISDN	Integrated Services Digital Network																																																												
CRs	Capability Requirements	ITU-T	International Telecommunication Union - Telecommunication Standardization Sector																																																												
DISA	Defense Information Systems Agency	kbps	kilobits per second																																																												
DSN	Defense Switched Network	Mbps	Megabits per second																																																												
DSS1	Digital Subscriber Signaling 1	MLPP	Multi-Level Precedence and Preemption																																																												
FRs	Feature Requirements	ms	milliseconds																																																												
G.711	Pulse Code Modulation of voice frequencies	PRI	Primary Rate Interface																																																												
G.723.1	Dual rate speech coder for multimedia communications transmitting at 5.3 and 6.3 kbps	SS7	Signaling System 7																																																												
G.726	32 kbps Adaptive Differential Pulse Code Modulation (ADPCM)	SUT	System Under Test																																																												
G.727	5-, 4-, 3- and 2-bit/sample embedded adaptive differential pulse code modulation (ADPCM)	T1	Digital Transmission Link Level 1 (1.544 Mbps)																																																												
G.729	9.6 kbps Conjugate-Structure Algebraic-Code-Excited Linear-Prediction (CS-A CELP)	T1.607	ISDN – Layer 3 Signaling Specification for Circuit Switched Bearer Service for DSS1																																																												
IEEE	Institute of Electrical and Electronics Engineers	T1.619a	SS7 and ISDN MLPP Signaling Standard for T1																																																												
		TDM	Time Division Multiplex																																																												
		UCR	Unified Capabilities Requirements																																																												

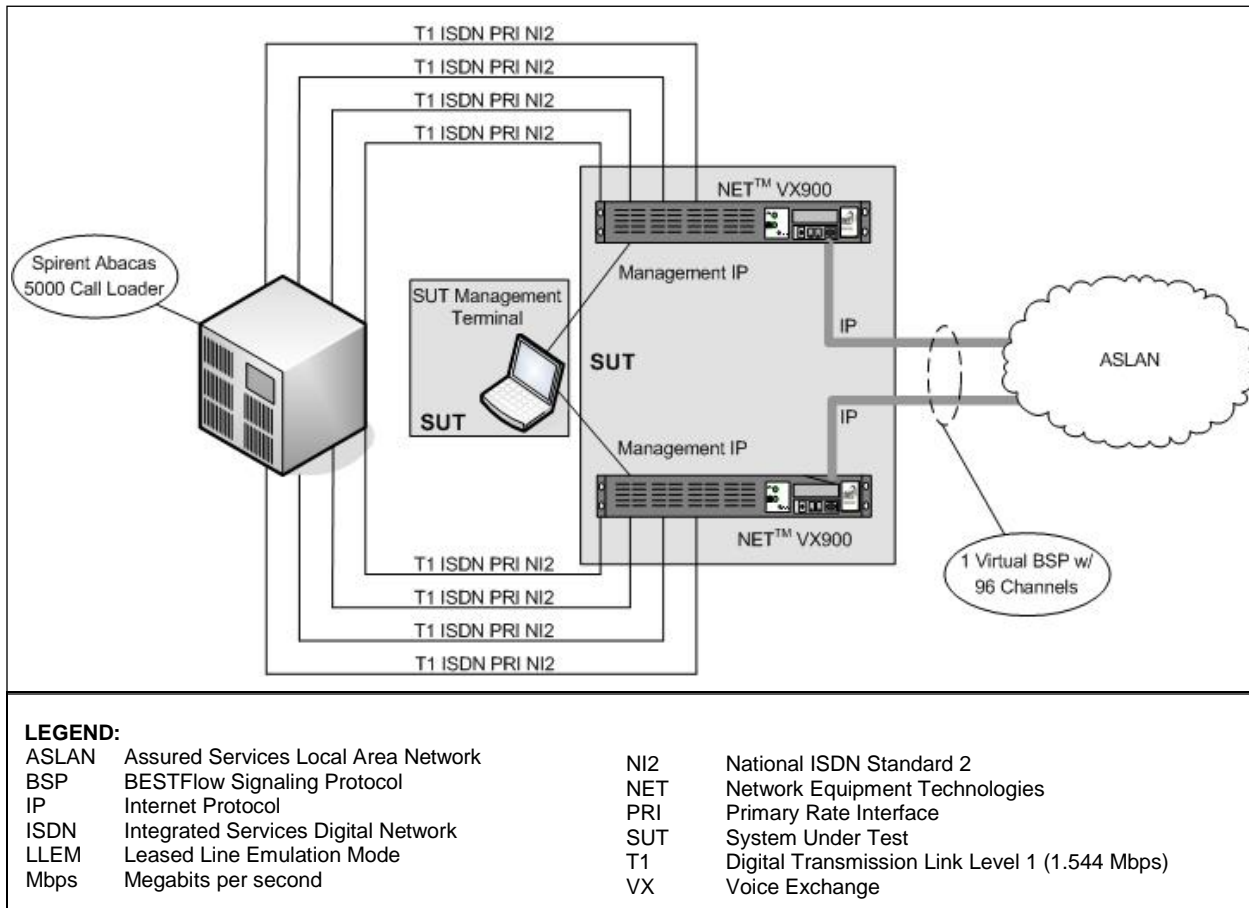
**Table 2-2. SUT Capability and Feature Interoperability Requirements**

DSN Access Interfaces			
Interface	Critical	Requirements Required or Conditional	References
T1 PRI (ANSI T1.607/ T1.619a)	No <sup>1</sup>	<ul style="list-style-type: none"> <li>• DS1 Interface Characteristics (C) as specified in UCR 2008, Section 5.2.6.1</li> <li>• DS1 Supervisory Channel Associated Signaling (C) as specified in UCR 2008, Section 5.2.6.1</li> <li>• DS1 Clear Channel Capability (C) as specified in UCR 2008, Section 5.2.6.1</li> <li>• DS1 Alarm and Restoral Requirements (C) as specified in UCR 2008, Section 5.2.6.1</li> <li>• MOS (R)</li> <li>• BERT (R)</li> <li>• Secure Transmission (Voice and Data) (R) as specified in UCR 2008, Section 5.2.12.6</li> <li>• Modem (R)</li> <li>• Facsimile (R)</li> <li>• Call Control Signals (R)</li> <li>• Alarms (R) as specified in UCR 2008, Section 5.2.1.5.7</li> <li>• Call Congestion Control (R)</li> <li>• Call Congestion for TDM Transport (C)</li> <li>• Voice Compression (C)</li> </ul>	<ul style="list-style-type: none"> <li>• UCR Section 5.9.2.3.4</li> <li>• UCR Section 5.9.2.3.4</li> <li>• UCR Section 5.9.2.3.4</li> <li>• UCR Section 5.9.2.3.4</li> <li>• UCR Section 5.9.3.1</li> <li>• UCR Section 5.9.3.1</li> <li>• UCR Section 5.9.3.8</li> <li>• UCR Section 5.9.3.1</li> <li>• UCR Section 5.9.3.1</li> <li>• UCR Section 5.9.3.1</li> <li>• UCR Section 5.9.3.5</li> <li>• UCR Section 5.9.3.4</li> <li>• UCR Section 5.9.2.1.2.1</li> <li>• UCR Section 5.9.3.1</li> </ul>
DSN Transport Interfaces			
Interface	Critical	Requirements Required or Conditional	References
IP Fast Ethernet (IEEE 802.3u)	No <sup>2</sup>	<ul style="list-style-type: none"> <li>• DS1 Interface Characteristics (R)</li> <li>• MOS (R)</li> <li>• BERT (R)</li> <li>• Forward Error Correction (R)</li> <li>• Secure Transmission (Voice and Data) (R) as specified in UCR 2008, Section 5.2.12.6</li> <li>• Modem (R)</li> <li>• Facsimile (R)</li> <li>• Call Control Signals (includes MLPP) (R)</li> <li>• Congestion Control (C) (IP interface only)</li> <li>• Voice Compression (C)</li> <li>• Alarms</li> <li>• Delay (R)</li> <li>• Jitter (R)</li> <li>• Packet Loss (R)</li> </ul>	<ul style="list-style-type: none"> <li>• UCR Section 5.9.2.3.4</li> <li>• UCR Section 5.9.3.1</li> <li>• UCR Section 5.9.3.1</li> <li>• UCR Section 5.9.3.1</li> <li>• UCR Section 5.9.3.8</li> <li>• UCR Section 5.9.2.1</li> <li>• UCR Section 5.9.2.1</li> <li>• UCR Section 5.9.3.7</li> <li>• UCR Section 5.9.3.4</li> <li>• UCR Section 5.9.3.1</li> <li>• UCR Section 5.9.3.5</li> <li>• UCR Section 5.9.3.3</li> <li>• UCR Section 5.9.3.3</li> <li>• UCR Section 5.9.3.3</li> </ul>
SUT Features And Capabilities			
Feature/Capability	Critical	Requirements Required or Conditional	References
Synchronization	Yes	<ul style="list-style-type: none"> <li>• Timing (R) as specified in UCR 2008, Section 5.2.10.1</li> </ul>	<ul style="list-style-type: none"> <li>• UCR Section 5.9.2.3.7</li> </ul>
Network Management	Yes	<ul style="list-style-type: none"> <li>• Management Option (R)</li> <li>• Local Management (Front or Back Panel and/or External Console) (C)</li> <li>• ADIMSS (C) as specified in UCR 2008, sections 5.2.8, Network Management, 5.2.8.3, Fault Management, and 5.2.8.4, Configuration Management.</li> <li>• Fault Management (C)</li> <li>• Loop Back Capability (C)</li> <li>• Operational Configuration Restoral (R)</li> </ul>	<ul style="list-style-type: none"> <li>• UCR Section 5.9.2.4.1</li> <li>• UCR Section 5.9.2.4.2</li> <li>• UCR Section 5.9.2.4.3</li> <li>• UCR Section 5.9.2.4.4</li> </ul>
Security	Yes	<ul style="list-style-type: none"> <li>• STIGs and DoDI 8510.01 (DIACAP) (R)</li> </ul>	<ul style="list-style-type: none"> <li>• UCR Section 5.9.2.6</li> </ul>
<b>NOTES:</b> 1 The UCR does not stipulate a minimum required DSN access interface. 2 The UCR does not stipulate a minimum required DSN transport interface.			

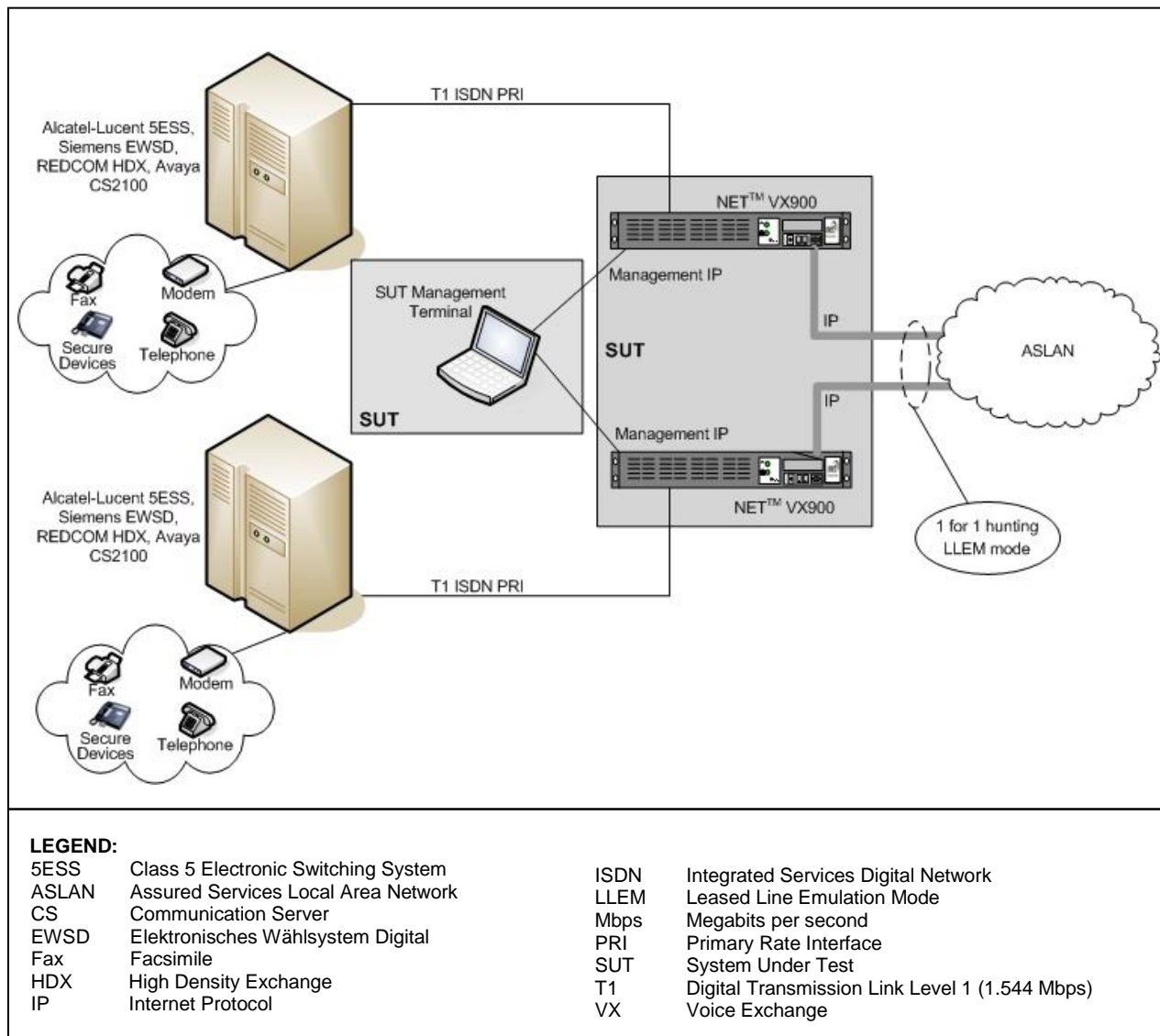
**Table 2-2. SUT Capability and Feature Interoperability Requirements (continued)**

<b>LEGEND:</b>			
802.3u	Standard for carrier sense multiple access with collision detection at 100 Mbps	ISDN	Integrated Services Digital Network
ADIMSS	Advanced DSN Integrated Management Support System	Mbps	Megabits per second
ANSI	American National Standards Institute	MLPP	Multi-Level Precedence and Preemption
BERT	Bit Error Rate Test	MOS	Mean Opinion Score
C	Conditional	PRI	Primary Rate Interface
DIACAP	Department of Defense Information Assurance Certification and Accreditation Process	R	Required
DoDI	Department of Defense Instruction	SS7	Signaling System 7
DS1	Digital Signal Level 1	STIGs	Security Technical Implementation Guides
DSN	Defense Switched Network	SUT	System Under Test
DSS1	Digital Subscriber Signaling 1	T1	Digital Transmission Link Level 1 (1.544 Mbps)
IEEE	Institute of Electrical and Electronics Engineers	T1.607	ISDN – Layer 3 Signaling Specification for Circuit Switched Bearer Service for DSS1
IP	Internet Protocol	T1.619a	SS7 and ISDN MLPP Signaling Standard for T1
		TDM	Time Division Multiplexing
		UCR	Unified Capabilities Requirements

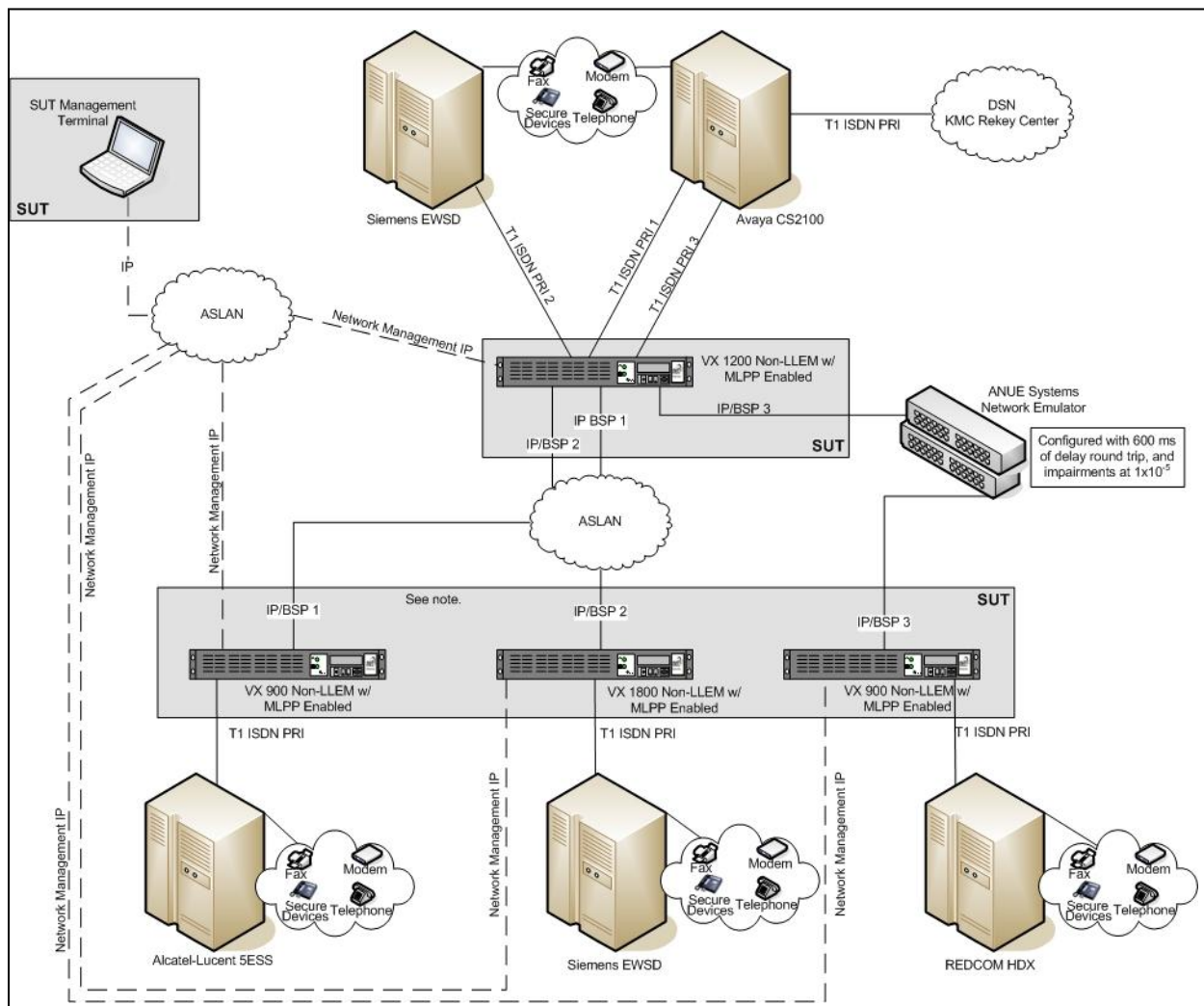
**8. TEST NETWORK DESCRIPTION.** The SUT was tested at JITC's Global Information Grid Network Test Facility in a manner and configuration similar to that of the DSN operational environment. This testing was conducted using the test configurations shown in Figures 2-2 through 2-5. Figure 2-2 depicts the Call Loading Test Network. Figure 2-3 depicts the SUT in the test network in the LLEM Mode. Figure 2-4 depicts the SUT in the test network in the non-LLEM mode. Figure 2-5 depicts how the SUT was used to test Department of Defense Secure Communications Devices (DSCD)s in a simulated deployed environment connected to the Defense Information System Network (DISN) strategic core.



**Figure 2-2. SUT Test Call Load Network in the LLEM/non-LLEM Modes**



**Figure 2-3. SUT Test Network in the LLEM Mode**



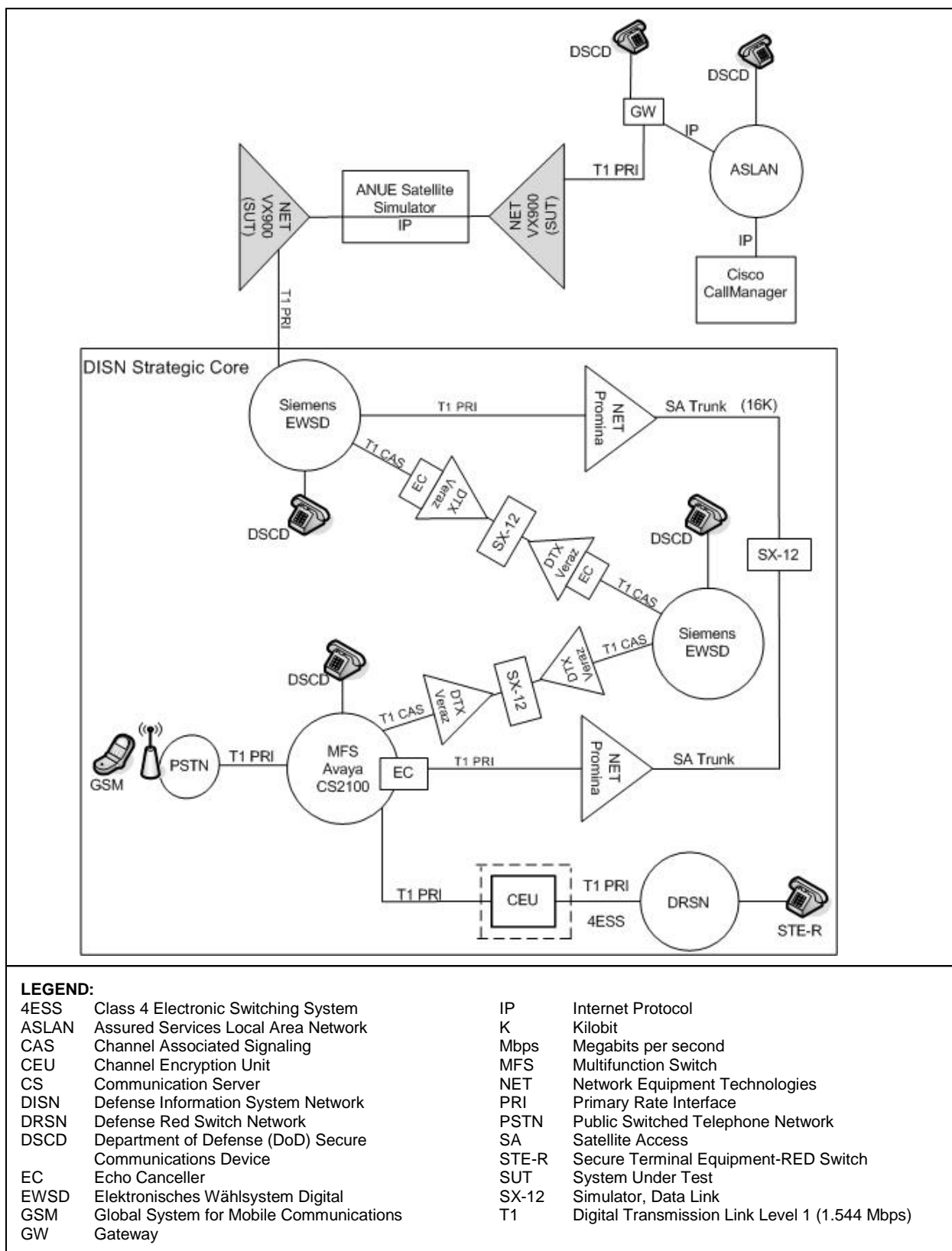
**NOTE:** Non-LLEM must be configured for MLPP in order to function properly within this network configuration. Refer to the SUT deployment guide for MLPP configuration in the non-LLEM mode. The VX900s and VX1800 depicted in this diagram represent deployed sites, and would normally have their own management workstations; however, for testing purposes all SUT management was accomplished from one workstation.

**LEGEND:**

5ESS Class 5 Electronic Switching System  
 ASLAN Assured Services Local Area Network  
 BSP BESTFlow Signaling Protocol  
 CS Communication Server  
 DSN Defense Switched Network  
 EWSD Elektronisches Wählsystem Digital  
 Fax Facsimile  
 HDX High Density Exchange  
 IP Internet Protocol  
 ISDN Integrated Services Digital Network

KMC Key Management Center  
 LLEM Leased Line Emulation Mode  
 Mbps Megabits per second  
 MLPP Multi-Level Precedence and Preemption  
 ms milliseconds  
 PRI Primary Rate Interface  
 SUT System Under Test  
 T1 Digital Transmission Link Level 1 (1.544 Mbps)  
 VX Voice Exchange™

**Figure 2-4. SUT in the Non-LLEM Mode**



**Figure 2-5. SUT with the DISN Strategic Core**



**9. SYSTEM CONFIGURATIONS.** Table 2-3 provides the system configurations, hardware, and software components tested with the SUT. The SUT was tested in an operationally realistic environment to determine interoperability with a complement of DSN switches noted in Table 2-3. Table 2-3 lists the DSN switches, which depict the tested configuration, and is not intended to identify the only switches that are certified with the SUT. The SUT is certified with switching systems listed on the Unified Capabilities (UC) Approved Products List (APL) that offer the same certified access interfaces as the SUT. The SUT is fielded in pairs and each pair must have the same software release.

**Table 2-3. Tested System Configurations**

System Name		Software		
Avaya CS2100		Succession Enterprise (SE) 09.1		
Alcatel-Lucent 5ESS		5E16 Broadcast Warning Message (BWM) 09-0002		
Siemens EWSD		19d Patch Set 46		
REDCOM HDX		3.0a r3p0		
Cisco CallManager		4.3(2) SR1b IOS 12.4(15)T8		
System Under Test				
NET VX software rel. 4.7.4v7	VX System	Hardware	Function	Version
	900	STIX-4T1E1/DSP	Provides 4 T1/E1 ports	4.7.4.7
	1200	STIX-4T1E1/DSP	Provides 4 T1/E1 ports	4.7.4.7
	1800	STIX-2T1E1/DSP	Provides 2 T1/E1 ports	4.7.4.7
		STIX-2T1E1/DSP	Provides 2 T1/E1 ports	4.7.4.7
		STIX-4T1E1/DSP	Provides 4 T1/E1 ports	4.7.4.7

**NOTE:** All VX nodes have embedded Microsoft Windows XP Service Pack 2

**LEGEND:**

5ESS	Class 5 Electronic Switching System	JITC	Joint Interoperability Test Command
CS	Communication Server	Mbps	Megabits per second
DSP	Digital Signaling Processor	NET	Network Equipment Technologies
E1	European Basic Multiplex Rate (2.048 Mbps)	STIX	System Trunk Interface Extender
EWSD	Elektronisches Wählsystem Digital	T1	Digital Transmission Link Level 1 (1.544 Mbps)
HDX	High Density Exchange	VX	Voice Exchange

**10. TESTING LIMITATIONS.** None.

## **11. TEST RESULTS**

### **a. Discussion**

(1) DSN Access/Transport Interfaces. The SUT supports ANSI T1 PRI access interfaces. The SUT supports IP transport interfaces. The specific requirements and test results tested over the SUT DSN access and transport interfaces are described in the subparagraphs below.

(a) T1 Interface Characteristics. The UCR 2008 Change 1, section 5.9.2.3.4, states that the T1 interface shall meet the requirements in accordance with UCR 2008, section 5.2.6.1. The Sunrise T10 test set was used to measure the SUT Digital Signal Level 1 (DS1) pulse mask to verify compliance to this requirement. The

SUT supports the ITU-T G.711 and ANSI T.102 pulse mask characteristics, which meets this requirement. The SUT T1 interface supports Bipolar Eight Zero Substitution (B8ZS) line coding as required in the UCR 2008, section 5.2.6.1.1.

(b) MLPP. The SUT has the capability of being configured for MLPP in a LLEM or non-LLEM configuration. In the LLEM configuration, the SUT is configured for point-to-point only between two VX nodes. However, in the non-LLEM configuration, the SUT is configured for point-to-multipoint. For non-LLEM mode, the BESTFlow Signaling Protocol (BSP) is a proprietary virtual channel that is typically set as a 1 for 1 hunting with LLEM. By configuring the SUT with a separate BSP group for each Time Division Multiplex (TDM) T1 interface, the user will ensure that any MLPP interaction will stay within its respective natural route. If all the BSP channels are grouped together it is possible that an active call going to a different interface will be preempted and the call will still be unable to complete, as the resource on the TDM T1 interface will be unable to reach its destination due to saturation of available TDM T1 resources. Configuration of LLEM and non-LLEM with MLPP enabled is provided in the vendor deployment guide.

(c) T1 Clear Channel Capability. The UCR 2008 Change 1, section 5.9.2.3.4, states that the T1 interface shall meet the clear channel capability requirements in accordance with UCR 2008, section 5.2.6.1.3. The SUT is capable of transmitting and receiving B8ZS line coding in accordance with UCR 2008, section 5.2.6.1.3, which meets this requirement.

(d) Mean Opinion Score (MOS). The UCR 2008 Change 1, section 5.9.3.1, states that the introduction of DNEs shall not cause the end-to-end average MOS to fall below 3.6 over any five-minute time interval. Each voice codec was tested using the EMODEL Mean Opinion Score (EMOS) and the Sage Mean Opinion Score (SMOS) with the Sage 960b. All results for all codec's supported by the SUT varied dependent on the voice codec used, and met the requirement for both EMOS and SMOS voice quality measurements. The results for each codec are as follows:

1. ITU-T G.711: EMOS of 4.2 and SMOS of 4.3
2. ITU-T G.729: EMOS of 4.1 and SMOS of 4.07
3. ITU-T G.727: EMOS of 4.09 and SMOS of 3.72
4. ITU-T G.726: EMOS of 4.08 and SMOS of 3.72
5. ITU-T G.723.1: EMOS of 4.09 and SMOS of 4.0

(e) Bit Error Rate Test (BERT). The UCR 2008 Change 1, section 5.9.3.1, states that the introduction of an NE shall not exceed the end-to-end digital bit error rate requirement of less than 1 error in  $1 \times 10^9$  (averaged over a 9-hour period). The SUT met this requirement for all interfaces with a recorded bit error ratio of  $1 \times 10^{-9}$  over an 8 to 36-hour period with multiple tests spanning a 48-hour period with no errors. Results for all calls with delay injected into the network of over 600 milliseconds (ms) worked properly and all secure call attempts were successful. The SUT provided reliable communications even with impairments injected into the network at  $1 \times 10^{-5}$  or 1 bit error

every 100,000 bits using the ANUE Systems IP satellite simulator impairment device. The SUT does not support forward error correction in accordance with the UCR 2008, Change 1, paragraph 5.9.3.1. This is a new UCR requirement and the vendor has 18 months (until July 2011) to develop this.

(f) Secure Transmission (Voice and Data). The UCR 2008 Change 1, section 5.9.3.8, states that in processing secure calls (SCIP) across conversion boundaries such as TDM to IP and/or IP to TDM, the DNE shall utilize the ITU-T V.150.1 standards implementation IAW.NSA SCIP-215 “U.S. Secure Communication Interoperability Protocol (SCIP) over IP Implementation Standard and Minimum Essential Requirements (MER) Publication” and SCIP 216 “Minimum Essential Requirements (MER) for ITU-T V.150.1 Gateways Publication” for said ingress and egress conversions respectively. The DNE shall support this NSA ITU-T V.150.1 implementation capability on all DNE interface ports where secure call conversion can occur. The secure call handling implementation on the DNE shall also meet the requirements of Section 5.9.2.1, Sub-Requirement 3. The UCR 2008 Change 1, section 5.9.2.1, states that the introduction of NE(s) shall not degrade secure transmission for secure end devices as defined by UCR 2008, section 5.2.12.6. There were 231 secure calls placed between Secure Terminal Equipment (STEs) and Secure Wireline Terminal (SWTs), STE to STE, SWT to SWT, vIPer to vIPer, and all combinations of all these devices without degrading transmissions between end devices. This met the requirement with a secure call completion rate of 99 percent for ITU-T V.150.1, and a secure call completion rate of 100 percent with the proprietary Modem Relay with the injected impairment of  $1 \times 10^{-5}$  using the ANUE Systems IP satellite simulator impairment device. The SUT supports the standards based ITU-T V.150.1 for modem over IP and all calls were tested with this as well as with the SUT proprietary Secure Relay. The SUT secure call tests and the supported voice compressions as well as modem results are shown in Table 2-4.

**Table 2-4. SUT Secure Call Test Results**

DSN Access Interfaces	DSN Transport Interface	Secure Call Matrix (10 calls placed per combination with a 99% completion rate)				
		From To	STE (SCIP mode)	PSTN vIPer	STE (ISDN mode)	SWT
T1 ISDN PRI	IP (IEEE 802.3u) with ITU-T G.711, G.723.1 (5k/6k) G.726, G.727, G.729 (Secure Relay and UMR)	STE (SCIP mode)	Completed	Completed	Completed	Completed
		PSTN vIPer	Completed	Completed	Completed	Completed
		STE (ISDN mode)	Completed	Completed	Completed	Completed
		SWT	Completed	Completed	Completed	Completed
		OMNI	Completed	Completed	Completed	Completed

**Table 2-4. SUT Secure Call Test Results (continued)**

<b>LEGEND:</b>			
802.3u	Standard for carrier sense multiple access with collision detection at 100 Mbps	ISDN	Integrated Services Digital Network
DSN	Defense Switched Network	ITU-T	International Telecommunication Union - Telecommunication Standardization Sector
G.711	Pulse Code Modulation of voice frequencies	Mbps	Megabits per second
G.723.1	Dual rate speech coder for multimedia communications transmitting at 5.3 and 6.3 kbps	PRI	Primary Rate Interface
G.726	32 kbps Adaptive Differential Pulse Code Modulation (ADPCM)	PSTN	Public Switched Telephone Network
G.727	5-, 4-, 3- and 2-bit/sample embedded adaptive differential pulse code modulation (ADPCM)	SCIP	Secure Communications Internet Protocol
G.729	9.6 kbps Conjugate-Structure Algebraic-Code-Excited Linear-Prediction (CS-A CELP)	STE	Secure Terminal Equipment
IEEE	Institute of Electrical and Electronics Engineers	SUT	System Under Test
IP	Internet Protocol	SWT	Secure Wireline Terminal
		T1	Digital Transmission Link Level (1.544 Mbps)
		UMR	Universal Modem Relay (ITU-T V.150.1)

(g) Modem. The UCR 2008 Change 1, section 5.9.2.1 states that the DNE(s) shall support a minimum modem transmission speed of 9.6 kilobits per second (kbps) across the associated pair of DNE(s). There were 231 T1 modem calls placed through the SUT using multiple secure devices, and test laptops. All modem calls had a transmission rate of 9.6 kbps or better, which met the requirement.

(h) Facsimile. The UCR 2008 Change 1, section 5.9.2.1, states that the DNE(s) shall support a minimum facsimile transmission speed of 9.6 kbps across the associated NE(s). There were over 100,000 T1 facsimile calls placed through the SUT using the Abacus call loader. All facsimile calls had a transmission rate of 14.4 kbps, with a success rate of 99.9 percent, which met the requirement.

(i) Call Control Signals. The UCR 2008 Change 1, section 5.9.3.7, states that the DNE shall transport all call control signals transparently on an end-to-end basis. This requirement was verified via testing and the vendor's LoC.

The SUT is also capable of providing MLPP functions within the transport as well as on TDM interfaces. All MLPP interaction was tested throughout the test period and works in accordance with the UCR requirements. Refer to the vendor deployment guide for all configuration requirements for MLPP in non-LLEM configuration.

(j) Delay. Delay occurs when packets take more time than expected to reach their destination. The UCR 2008 Change 1, section 5.9.3.3, states that the addition of DNEs shall not increase the one-way packet delay for each DNE used, when measured from ingress to egress and averaged over any five-minute period more than that which is specified under the following conditions:

1. TDM Ingress ITU-T G.711 (Non-secure calls) to Non-Transcoding ITU-T G.711 IP Egress shall not increase delay more than 50 ms per NE pair as measured end-to-end. The SUT had a measured a 68 ms delay. This was adjudicated by DISA on 30 July 2010 as having a minor operational impact.

2. TDM Ingress ITU-T G.711 (Non-secure calls) to Transcoding IP Egress with compression codecs (Section 5.9.2.3.9) shall not increase delay by more than 100 ms per NE pair as measured end-to-end. The following are results for each codec supported by the SUT.

1. ITU-T G.729: 66.2ms of delay
2. ITU-T G.727: 63.7ms of delay
3. ITU-T G.726: 65ms of delay
4. ITU-T G.723.1: 76ms of delay

3. TDM Ingress ITU-T G.711 (Secure calls) to Non-Transcoding G.711 IP Egress shall not increase delay by more than 50 ms per NE pair as measured end-to-end. The SUT had a measured a 68 ms delay. This was adjudicated by DISA on 30 July 2010 as having a minor operational impact.

4. TDM Ingress ITU-T G.711 (Secure calls) to Transcoding IP Egress with compression codec's (Section 5.9.2.3.9) shall not increase delay by more than 250 ms per NE pair as measured end-to-end. The SUT invokes a model relay when placing secure calls and therefore does not increase the delay any more than what is noted in paragraph 11.a.(1)(j)2.

(k) Jitter (Transport IP Interface). The UCR 2008 Change 1, section 5.9.3.3, states that the insertion of a NE shall not cause jitter measured from ingress to egress to increase by more than five ms averaged over any five-minute period. The SUT jitter measurement averaged over a five-minute period was .03 ms, which met the requirement.

(l) Packet Loss (Transport IP Interface). The UCR 2008 Change 1, section 5.9.3.3, states that the insertion of a NE shall not cause packet loss measured from ingress to egress to increase by more than 0.05 percent averaged over any five-minute period. The packet loss for the SUT was measured 0.02 percent for any five-minute period, which met this requirement.

(m) Differential Services Code Point (DSCP) Layer 3 Quality of Service (Transport IP Interface). The NE shall implement IP congestion control. Congestion may be controlled by using Differentiated Services, which shall be capable of providing preferential treatment for call congestion over other media types, in accordance with UCR 2008 Change 1, section 5.3.3.3.2 with a capability to limit the provisioning of input and output interfaces such that congestion not possible under the worst transport congestion scenario. The SUT sends media and signaling sessions in separate packet streams and in accordance with the UCR 2008 Change 1, the sessions must be tagged with different DSCP values. The SUT has the capability to set the DSCP value on a port-by-port basis from 0-63 allowing the voice media and signaling to be set at different values. This will allow the proper prioritization to protect voice and signaling media with a higher prioritization than data within the converged Local Area Network. The NE supports layer 3 DSCP and the value is settable from 0-63, which meets the

requirements for DSCP tagging as described in the UCR 2008 Change 1. The DSCP value for signaling was set to 48, for voice media the value was set to 46. Packets were captured from the SUT using the Wireshark application to verify that values were correct, and can be set to any value 0-63 in accordance with Reference (c).

(n) Alarm and Restoral Requirements. The UCR 2008 Change 1, section 5.9.2.1.1, states that the NE shall be able to propagate Carrier Group Alarms (CGAs), in accordance with UCR 2008, section 5.2.1.5.7, upon physical loss of either the access or transport interfaces. The SUT is capable of transparently passing the appropriate alarms, which met the requirement. This was verified by capturing the alarm status between the DSN switches and the SUT with the Sage 375A and Ultra-T1 test equipment.

(o) Call Congestion. The UCR 2008 Change 1, section 5.9.3.4, states that the DNEs that use encapsulated TDM shall meet all the following requirements:

1. The DNE shall use either differentiated services or integrated services to provide preferential treatment over IP transport.

2. The DNE shall provide an IP bandwidth reservation/allocation mechanism to allow for the user-specified allocation of bandwidth to support the full nonblocking voice services requirement.

3. The DNE shall implement IP congestion control. Congestion may be controlled by using differentiated services that shall be capable of providing preferential treatment for call congestion over other media types in accordance with Section 5.3.3, and a capability to limit the provisioning of input and output interfaces, so congestion is impossible under the worst transport congestion scenario.

Call congestion in the SUT is met because congestion is not possible due to the fact that total TDM ingress bandwidth cannot saturate the transport link on the SUT.

(p) Voice Compression. The UCR 2008 Change 1, section 5.9.3.1, states that the DNEs may include voice compression, as specified in Section 5.9.2.2, Compression, to include the following additional compression standard: ITU-T Recommendation G.723. Section 5.9.2.2, states that the SUT may support the following codecs:

- International Telecommunication Union - Telecommunication Standardization Sector (ITU-T) Recommendation G.726, 32 kbps Adaptive Differential Pulse Code Modulation (ADPCM)
- ITU-T Recommendation G.728, 16 kbps Low-Delay Code Excited Linear Prediction (LD-CELP)
- ITU-T Recommendation G.729, 9.6 kbps Conjugate-Structure Algebraic-Code-Excited Linear-Prediction (CS-A CELP)

The following codecs are supported by the SUT and were tested: ITU-T G.711, ITU-T G.723.1(5k/6k), ITU-T G.726, ITU-T G.727, and ITU-T G.729

## (2) Device Management

(a) Management Option. The UCR 2008 Change 1, section 5.9.2.4.1, states that the NE devices must be managed by at least one of the following: The device may be managed locally by a front or back panel and/or external console control capability shall be provided for local management. The NE may be able to be centrally monitored and managed by the Advanced DSN Integrated Management Support System (ADMISS) in accordance with UCR 2008, sections 5.2.8.3 and 5.2.8.4. The SUT is managed from a remote client, which can be used to monitor multiple units. The SUT is monitored by a management workstation. The workstation connects to the SUT via Ethernet connection and uses a proprietary application called VXWatch.exe via TLS (Transport Layer Security) for secure encrypted session tunneling, which meets the requirement. Administrative tasks are performed via the proprietary application VXBuilder.exe. The application VXBuilder.exe allows an administrator to configure general settings, create or edit services, manage media processor units, and perform maintenance, while the VXWatch.exe provides administrators with the capability of monitoring the multiple SUT nodes simultaneously.

(b) Fault Management. The UCR 2008 Change 1, section 5.9.2.4.2, states that NEs may be capable of performing a self-test diagnostic function on non-active and active channels on a noninterference basis and report any failures to the assigned network management system. The SUT supports fault management using a secure management workstation.

(c) Loop Back Capability. The UCR 2008 Change 1, section 5.9.2.4.3, states that the NE may provide loop back capability on each of the trunk side interfaces in accordance with ITU-T Recommendation V.54, "Loop Test Devices For Modems." This is not supported by the SUT. Since this is a conditional requirement for an NE, there is no operational impact.

(d) Operational Configuration Restoral. The UCR 2008 Change 1, section 5.9.2.4.4, states that loss of power should not remove configuration settings. The unit should be restored to the last customer configured state prior to the power loss, without intervention when power is restored. The SUT was placed into a power failure condition from 5 minutes to 48 hours at separate intervals. The SUT returned to the last customer configured state prior to the power failure, which met the requirement.

(3) Security. The UCR Change 1, section 5.9.2.6, states that the NE shall conform to the requirements outlined in Department of Defense Instruction (DoDI) 8510.01, "DoD Information Assurance Certification and Accreditation Process (DIACAP)". Security is tested as part of the Information Assurance testing and is covered under a separate report, Reference (e).

**b. System Interoperability Results.** The SUT meets all of its critical interoperability requirements set forth in Reference (c) for a DNE and is certified as interoperable for joint use within the DSN. The SUT is deployed as a mated pair, and both SUTs must be loaded with the same certified 4.7.4v7 software release in order to interoperate correctly. When connected to the interfaces certified in this letter, the SUT and its associated applications were transparent to the switching systems interfaced causing no degradation of service or negative impact, and met all the critical interoperability requirements.

**12. TEST AND ANALYSIS REPORT.** No detailed test report was developed in accordance with the Program Manager's request. JITC distributes interoperability information via the JITC Electronic Report Distribution (ERD) system, which uses Unclassified-But-Sensitive Internet Protocol Router Network (NIPRNet) e-mail. More comprehensive interoperability status information is available via the JITC System Tracking Program (STP). The STP is accessible by .mil/gov users on the NIPRNet at <https://stp.fhu.disa.mil>. Test reports, lessons learned, and related testing documents and references are on the JITC Joint Interoperability Tool (JIT) at <http://jit.fhu.disa.mil> (NIPRNet), or <http://199.208.204.125> (SIPRNet). Information related to DSN testing is on the Telecom Switched Services Interoperability (TSSI) website at <http://jitc.fhu.disa.mil/tssi>. Due to the sensitivity of the information, the Information Assurance Accreditation Package (IAAP) that contains the approved configuration and deployment guide must be requested directly through government civilian or uniformed military personnel from the Unified Capabilities Certification Office (UCCO), e-mail: [ucco@disa.mil](mailto:ucco@disa.mil).